

FY 1981 RDT&E DESCRIPTIVE SUMMARY

Program Element: #35158F

Title: Satellite Data System (SDS)

DoD Mission Area: Strategic Communications, #133

Budget Activity: Strategic Programs, #3

RESOURCES (PROJECT LISTING): (\$ in thousands)

Project Number	Title	<u>FY 1979 Actual</u>	<u>FY 1980 Estimate</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>Additional to Completion</u>	<u>Total Estimated Costs</u>
N/A	TOTAL FOR PROGRAM ELEMENT	23,130	36,300	45,300	27,900	Continuing	Not Applicable

BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Satellite Data System (SDS) is a multi-payload, communications satellite which provides reliable and secure communications. Operating in conjunction with the synchronous equatorial Fleet Satellite Communications satellites, the SDS completes the coverage required by the Air Force Satellite Communications (AFSATCOM) system for essential command and control communications to our nuclear capable forces. The SDS also provides a high speed link between Air Force Satellite Control Facility (AFSCF) remote tracking stations for command and control.

BASIS FOR FY 1981 RDT&E REQUEST: This request includes funds for continuing the multi-year design and development efforts to improve the anti-jam capabilities of the AFSATCOM payload. Also included is the multi-year development necessary to produce a Space Shuttle optimized satellite. Sustaining engineering support is also required on a continuing basis.

OTHER APPROPRIATION FUNDS:

	<u>FY 1979 Actual</u>	<u>FY 1980 Estimate</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>Additional to Completion</u>	<u>Total Estimated Costs</u>
Missile Procurement (3020)	37,900	100,223	93,823	40,023	Continuing	Not Applicable
Quantities		1	1			
Satellites						

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DETAILED BACKGROUND AND DESCRIPTION: The Satellite Data System (SDS) provides critical, real-time command, control, and communications for Strategic Air Command Single Integrated Operational Plan (SIOP) and other nuclear capable forces. The SDS is an integral part of the Air Force Satellite Communications (AFSATCOM) system which also includes the Ultra High Frequency (UHF) communications capability on the geosynchronous equatorial Fleet Satellite Communications (FLTSATCOM) satellites, piggy-back transponders on selected host satellites, and airborne/ground radio terminals. As such, the SDS complements the FLTSATCOM satellite coverage by providing UHF polar coverage which the FLTSATCOM satellites cannot provide.

Additionally, SDS supports the Air Force Satellite Control Facility (AFSCF) requirement for reliable, two-way high data rate, S-band communications between AFSCF remote tracking stations.

| The direct benefits of SDS will be reliable and secure direct communications which will result in greatly improved command and control of our nuclear capable forces, elimination of the dependence on some of the vulnerable AFSCF communications.

RELATED ACTIVITIES: The space segment of the FLTSATCOM will be developed, procured, and launched under the Navy's FLTSATCOM Program Element (PE), 33109N. The Air Force aircraft and ground UHF radio terminals required for operation with the FLTSATCOM and SDS satellites are funded within the AFSATCOM Program Element, 33601F. The AFSCF stations are funded under the AFSCF Program Element, 35110F. Space Shuttle flights for SDS are provided by the Space Launch Support Program, PE 35171F.

WORK PERFORMED BY: Air Force Systems Command's Space Division, Los Angeles, CA, is responsible for the SDS. The prime contractor is Hughes Aircraft Company, El Segundo, CA. General Systems Engineering and Integration is performed by the Aerospace Corporation, El Segundo, CA.

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PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1979 and Prior Accomplishments: The technology phase of the program was completed in FY 1971. This was followed by a contract definition phase in FY 1972 which established the system configuration. The system acquisition contractor was selected by competitive source selection and a system development contract was awarded in June 1972. The system Critical Design Review (CDR) was successfully completed in March 1974 with all critical specifications being met or exceeded. The structural model satellite testing was finished in May 1975. A qualification model satellite was built and tested to fully qualify the satellite prior to production.

fully checked out on-orbit. Full operational capability was declared for all payloads after successful on-orbit checkout. All payloads were after

Primary activities in FY 1979 included the initiation of design and development activities associated with improving the anti-jam capabilities of the AFSATCOM payload on the sixth (F-6) and subsequent satellites, the continuation of the multi-year development of a Space Shuttle optimized design on the sixth (F-6) and subsequent satellites, reliability improvement efforts, and sustaining engineering support.

2. FY 1980 Program: Efforts for this year include sustaining engineering support, continuing design and development activities to improve the anti-jam capabilities of the Air Force Satellite Communications System (AFSATCOM) payload on the sixth Satellite Data System (SDS) satellite (F-6), and continuing the multi-year development necessary to transition to the Space Shuttle. Also included are continuing efforts to improve satellite payload reliabilities.

3. FY 1981 Planned Program: The increase from FY 1980 to FY 1981 is due to the fact that the Space Shuttle optimization and AFSATCOM anti-jam improvement activity will peak in the form of final design review, development tests, qualification tests, and design validation. Sustaining engineering support and payload reliability improvements will continue.

4. FY 1982 Planned Program: The FY 1982 plan is to continue sustaining engineering support, continue development of the anti-jam improvements for the AFSATCOM payload, and continue the development efforts related to Space Shuttle optimization.

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5. Program to Completion: This is a continuing program. As an integral part of the AFSATCOM (Air Force Satellite Communications) System, the program will continue to provide critical communications coverage and be totally compatible with the AFSATCOM aircraft and ground radio terminals. Sustaining engineering support will be required to maintain design compatibility and to incorporate improvements for survivability and reliability. Replenishment satellites will be procured to provide a reasonable probability of having a satellite available to launch in the event of an on-orbit failure.

6. Milestones:

Date

System Preliminary Design Review

Mar 73

System Critical Design Review

Mar 74

Launch First Satellite (F-1)

Launch Second Satellite (F-2)

Full Operational Capability

AFSATCOM System IOC

May 79

7. Resources: Not Applicable

8. Comparison with FY 1980 Budget Data:

FY 1980 Resource Listing (\$ in thousands):

	<u>FY 1978</u> <u>Actual</u>	<u>FY 1979</u> <u>Estimate</u>	<u>FY 1980</u> <u>Estimate</u>	<u>FY 1981</u> <u>Estimate</u>	<u>Additional</u> <u>to Completion</u>	<u>Total</u> <u>Estimated</u> <u>Costs</u>
RDT&E Total for Program Element	12,800	23,500	36,300	25,500	Continuing	Not Applicable
Missile Procurement	83,200	37,900	100,300	107,500	Continuing	Not Applicable

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The Fiscal Year 1981 RDT&E increase of \$19.8 million is to implement the shuttle optimized satellite design. This will allow for shuttle ride sharing and attendant launch cost benefits, as well as providing some payload growth capability. The Fiscal Year 1981 Missile Procurement decrease is due

Budget Activity: #3 - Strategic Programs

Program Element: 35158F - Satellite Data System

Test and Evaluation Data

1. Development Test and Evaluation: The development contractor for the Satellite Data System (SDS) was Hughes Aircraft Company, El Segundo, California. The first satellite was launched Initial Operational Capability was established in The first satellite (F-1) was funded entirely within the development program. The second satellite (F-2) was the first vehicle funded under the production program. The development hardware included engineering models of the communication subsystems, a structural model spacecraft (X-1) and a full-up qualification model spacecraft (Y-1). Development tests of the communications subsystems engineering models were completed in November 1973. Structural testing was satisfactorily completed on the X-1 engineering model spacecraft in May 1975. Systems level qualification was completed in October 1975 with all critical performance specifications met or exceeded. System level qualification was designed to demonstrate design integrity and performance to specification via a series of tests including shock, acoustic, modal survey, thermal, electromagnetic interference (EMI), solar-thermal vacuum, and integrated system test. The F-1 spacecraft was acceptance tested during the The Y-1 spacecraft was a fully configured spacecraft which has been refurbished and designated as flight vehicle (F-4).

2. Operational Test and Evaluation: A portion of the SDS Satellite system is part of the Air Force Satellite Communications (AFSATCOM) space segment. Classical separate IOT&E was not conducted on the space segments since all operational objectives/requirements were fully integrated into the DT&E effort and were not broken out separately. Compatibility, operational characteristics and orbit performance of payloads supporting AFSATCOM are scheduled to be demonstrated during the FOT&E of AFSATCOM. FOT&E of AFSATCOM is to be managed by AFTEC and scheduled to begin in FY 80. Results to date are contained in DT&E reports (see para. 1 above).

3. Systems Characteristics:

<u>Characteristics</u>	<u>Objectives</u>	<u>Demonstrated</u>
Data Rate in words per minute		
Message Bit Error Rate per ten thousand bits		
Anti-Jam Protection (db)		